المستوى الثالث - مجموعة البيولوجي - فيزياء حيوية

الإحصاء الحيوي (٢٠١)

جامعة المنصورة كلية العلوم -- قسم الرياضيات المـــادة:إحـــصاء حـــيـــوي كود المادة : ر ٣٠١ الدرجة الكلية : ٨٠ درجة		إمتحان دور يناير ٢٠١١ المستوى : الثـــالـــث شعب: برامج * التاريخ: ١٧ / ١ /٢٠١١ الزمن: ســـاعتان

Answer the following questions

Q1: (25 marks)

A random sample of size 36 is taken from a population with mean μ and variance σ^2 and tabled as :

Classes	2 — 4	4 — 6	6 — 8	8 — 10	10— 12
frequency	6	7	10	7	6

(a) Find the median (M) , the mode (D) and standard deviation (S) **(15 marks)**

(b) Compute a 95 % confidence interval for the mean μ . **(10 marks)**

Q2: (25 marks)

(a) Let X be a random variable has density function $f(x)=\begin{cases} a e^{-3x} & : x \geq 0 \ \ and \ \ a > o \\ 0 & otherwise \end{cases}$

Find (i) The value of a (ii) p (X = 3) and p (X < 3) (iii) E (X) and V(X) .

(b) A fair coin is tossed 10 times. Let X be the number of heads which appear .

Find p(X = 4) and p(X < 4). **(10 marks)**

Q3: (30 marks)

(a) Let X be a random variable having values 1 , 3 , 5 , 7 , 9 , 11 and Y another random variable having values 2 , 4 , 6 , 8 , 10 , 12 . Compare between the dispersion of the values X and the dispersion of the values Y. **(10 marks)**

(b) A random sample of size 49 is taken from a normal population with mean 12 and variance 36 . Find $p(\overline{X} \geq 14)$. **(10 marks)**

(c) A random sample has elements 8.5 , 11.5 , 9.5 , 10.5 , 8 , 9 , 11 , 10 , 12 is taken from a normal population $N(\mu,\sigma^2)$ with unknown mean and unknown variance. Find 95% confidence interval for μ. **(10 marks)**

Note that : p (Z < 2.34) = 0.99 p (Z > 2.34) = 0.01 p (Z < 1.5) = 0.93

$Z_{0.025}=1.96$, $Z_{0.05}=2{,}58$ $t_{(0.025,8)}=2.3$, $t_{(0.05,8)}=3.35$ $t_{(0.025,9)}=2.26$

برامج * (برنامج فيزياء حيوي ، علوم بيئة ، كيمياء ونبات . كيمياء وحيوان ، ميكروبيولوجى)

مع تمنيات اسرة التدريس (أ. د. محمود ياسين ، د. بية الدسوقي ، د. عديلة عثمان & د. محمد جاد)

المنوى كيمياء - الفيزياء الحيوية - التحليل الحجمى - التحليل الوزنى - (كـ ٣١٥)

Mansoura University **Faculty of Science** **Chemistry Department** **Subject: Chemistry** **Course(s):** Chem. (315)	كلية العلوم جامعة المنصورة	**First Term** **Third year Bio. Physical .** **Date : Jan. 2011** **Time Allowed: 2 hours** **Full Mark: 60 Marks**

Answer the Following Questions

1. Derive a curve for the titration of 50.0 ml of 0.1M HCl with 0.1 M NaOH, calculate the pH of the solution after the addition of 0.0, 10.0, 49.0, 50.0 and 60.0 ml of base. **[12 Marks]**

2. Define the following (mention example and low if present). 1- Accuracy 2- Rejection of a result (Q test). 3- Common - ion effect. 4- Co- precipitation. 5- precipitation titration. 6- Buffer capacity 7- Volhard method. 8- Plan of analysis

3. Mention the requirements for a primary standard material. **[6 Marks]**

4. Explain the use of adsorption indicator (fajans method) for precipitation titration. And mention the factors considered in choosing proper adsorption indicator. **[6 Marks]**

5. Derive a curve for the titration of 50.0 ml of 0.01 M Cu^{2+} buffered at pH 10.0 with 0.01 M EDTA, calculate the PCa volues of the solution after the addition of 0.0, 10.0, 49.0, 50.0 and 60.0 ml of EDTA solution. (keff. = 1.8×10^{10}). **[12 Marks]**

6. Explain and draw calomel electrode. **[6 Marks]**

7. Mention the requirements for successful gravimetric method. **[6 Marks]**

Examiners :

Dr. W. Abou El- Maaty

Mansoura University Faculty of Science Physics Department		First Term **3rd biophysics** Date: January 2011 Allowed time: 2 hours
Course : Radiation biophysics		

Answer three Questions Only:

1- a- Describe the principles of a radionuclide generator.

b. List the ideal characteristics of a radionuclide generator.

2- Discuiss the effect of different types of the collimators on the minification and magnification of the image in nuclear medicine.

3- How we can use the ionization and properation chamber to distinguish between alpha and beta particles.

4- Write short notes about the following

a- The different types for interaction of radiation with the Matter.
b- Different modes of decay in radioactive material

With our best wishes

Dr. Emad Elshewi

Dr. M. Saad*

D. Anwar Megahd

D. H. Salah

مستوى الثالث - فيزياء حيوية فاج ٣٢٧ - فيزياء البوليمرات

Mansoura University
Faculty of Science
Physics Department
Subject: BioPhy. 327
Physics: Polymer Physics

Academic Level: 3rd Level
Program: Biophysics
First Term Exam: Jan. 2011
Time Allow: 2 hours
Full Mark: 80 Marks

Answer (ALL) Questions:

1) What are the physical states of polymer? Discuss in details the first and the second order phase transitions in polymer. [20 Mark]

2) A- Write briefly on: [12 Mark]
- Classification of polymer on the basis of molecular shape.
- Effect of temperature and pressure on polymerization.
- Electrical conductivity of polymer.

B- Define the polymerization. Explain the Ionic polymerization. [8 Mark]

3) A-Explain the physical meaning of glass-transition temperature. [6 Mark]
B-Discuss two different methods used to determine Tg [14 Mark]

4) A- There are many popular techniques used to study polymer structure, discuss this sentence and describe Differential Scanning Calorimetry. [10 Mark]

B- Write briefly on the thermally stimulated current analysis. [10 Mark]

"With Good Luck"

Examiners:

1- Prof. A. El-Bedewy. *2- Dr. N. Knawy.*

3- Dr. Maysa Ismail. *4- Dr. A. Keder.*

Mansoura University Faculty of Science Department of Physics Course Code: Phys. 311 Title: Solid State Physics		First Semester (Jan. 2011) Exam Type (Final): 3rd Year (Physics, Biophysics) Time: Two Hours Full Mark: 80 Mark

Answer **only three** questions from the following

1- a: Find the shape and dimensions of the first Brillouin zone in a BCC lattice. [14 Mark]

b: Describe an experimental method for studying the structure of crystalline material. [13 Mark]

2- a: Discuss the type of binding in an inert-gas crystal and explain how the model agrees with the experimental data of the physical properties. [14 Mark]

b: Discuss the effect of imperfections on the physical properties of crystalline materials. [13 Mark]

3- a: Show that Brag equation and Laue equations are equivalent conditions for the diffraction in crystalline solids. [14 Mark]

b: Density of FCC copper is 8.96 g/cm^3 and its atomic mass is 63.54 g/atom. How many atoms per mm^2 are there in (*i*) (100) plane and (110) plane for copper which has FCC structure. [13 Mark]

4- a: The ionic radii of Cs and Cl are 0.165 and 0.181 nm and their atomic weights are 133 and 35.5 (g/atom), respectively. Calculate: (*i*) the density of CsCl, (*ii*) the spacing of (122) planes, (*iii*) number of molecules per cm^3. [14 Mark]

b: Derive a relation for the bulk modulus of NaCl in terms of its parameters. [13 Mark]

أطيب التمنيات : أ.د. حمدى دويدار

مستوى ثالث - فيزياء حيوية - ميكانيكا كم

Mansoura University Faculty of Scienc Physics Department		Third Year Bio-Physics Date: Jan. 2011 Time : 2 hours
Course (s): Quantum Mechanics		Full Mark :80 Mark

Answer the FIRST question and onlyTWO from the rest.:

1-a) A mono-energetic beam of electrons of energy E strike a potential step of height V_0 and infinite width. Calculate the reflection coefficient of the electrons in the case of $E<V_0$ and compare the result with the classical one. [15] Mark

-b) Using the time-independent perturbation theory to find the first-order correction in the energy eigenvalues and the corresponding eigenfunction of a perturbed harmonic oscillator and then calculate this correction if the perturbation $H'=bx^2$. [15] Mark

2-a) Derive the bound energy levels of a particle moving in a one-dimensional finite potential well given by $V(x)=-V_0$ inside the well and equal to zero outside the well. [15] Mark

-b) Derive the time-independent Schrodinger equation in momentum space. [10] Mark

3-a) Using the time-independent Schrödinger equation to determine the allowed energy levels and their corresponding eigenfunction of a particle of mass m and energy E moving in a harmonic oscillator potential well. [15] Mark

b) Calculate $[x , \hat{P}_x^2]$ and $[t , \hat{E}]$. [10] Mark

4-a) A particle of mass m and energy E moving inside a cubical box of length L, find the allowed energy eigen-values and their corresponding eigen-functions of the particle. Show the degeneracy of the lowest three energy levels . [15] Mark

b) Discuss the breakdown of the degeneracy of the first excited state under a small distortion (ΔL) in the length of the box in y-direction. [10] Mark

With best wishes

1- Prof. Dr. A. R Degheidy
2- Dr. H. Ibrahim
3- Dr. M Saad
4- Dr. H Sallah

المستوى الثالث: الفيزياء الحيوية - أطياف جزيئية ف ٢٣٨

Mansoura University
Faculty of Science
Physics Department

3^{rd} Level Exam.
January 2011
Time allowed : 2 hrs

Molecular Spectroscopy 329 ف

Answer the following questions.

1- *Without mathematical derivation of the moment of inertia I*, derive and draw the allowed rotational energy levels and their corresponding transitions of a rigid diatomic molecule. (20 marks)

2- a- Discuss the microwave activity of the following molecules
Cl_2 – OCS – HCL – CH_4 (10 marks)
b- Discuss the IR activity of CO_2 molecule for the following modes of vibration.
{symmetric stretching, bending, antisymmetric stretching} (10 marks)

3- The spectrum of HCL shows a fundamental absorption at 2886 cm^{-1} and first overtone at 5668 cm^{-1}. Calculate
a-the equilibrium frequency of oscillation ω_e (6 marks)
b-the anharmonicity constant χ_e (6 marks)
c-the zero point energy ε_0 in cm^{-1} and Joule. (8 marks)

4- a- Consider the non-linear triatomic molecule H_2O. Estimate and draw the allowed fundamental modes of vibration. Explain the change in the electric dipole moment of these modes of vibration. (10 marks)
b- The radiofrequency, microwave and infra-red regions of electromagnetic waves have different spectroscopic techniques. State these techniques. Comment. (10 marks)

($c=3\times10^{10}$ cm/s $h=6.625\times10^{-34}$ J.s $1eV=1.6\times10^{-19}$ J $m=9.11\times10^{-28}$ g)

Best Wishes

Prof. Dr. A. El-Khodary

Mansoura university Faculty of Science Physics Department		First Term Third Level Biophysics Programme Date: January 2011 Allowed time: 2 hours المنصورة- مصر
Exam: Molecular Biophysics	**Code: 311فح**	**Full Mark: 80 Mark**

[1] A- A chromatographic column of length 10 cm was used to separate 3 components. The 3 components were separated at 1, 1.5, 2 min. The base line width was 10, 15, 30 sec respectively. Calculate (a) the number of layers (b) height equivalent to theoretical plates and (c) Resolution? **[8 Marks]**

B- Define and explain each of the followings (Support your answer with illustrations): **[12 Marks]**

i) α-helix secondary protein structure. ii) Actin Band of RBCs membrane.

iii) Cholesterol iv) Lipoprotein.

C- Discuss in detail the procedure of separation of different biological macromolecules of fluid mosaic model by using non ionic detergent (n-Ocyltglucopyronoside)? **[7 Marks]**

[2] **A-** Compare between each of the followings (Support your answer with illustrations): **[12 Marks]**

i) Parallel and antiparallel Beta pleated sheet structures.

ii) Ankyrin and glyceraldehyde-3-phosphate dehydrogenase bands of red blood cell.

iii) Gel Chromatography and Affinity Chromatography.

iv) Primary DNA Structure and Secondary DNA Structure.

B- Discuss in detail ion exchange chromatography technique? Discuss the procedure of proteins separation by ion exchange chromatography? **[8 Marks]**

C- State Bear-Lambert law? Derive the logarithmic relation of Bear-Lambert in both liquids and gases? **[7 Marks]**

[3] A- Discuss in detail how the packing of fatty acids affects the flexibility and fluidity of cell membrane at different temperatures? **[13Mark]**

B- Discuss in detail the SDS-PAGE technique that used to identify different red blood cells proteins ? Deduce the physical formula that express the electrophoretic mobility of proteins in SDS-PAGE technique? **[13 Marks]**

Best Wishes

Examiners: Dr. Ahmed Abu-El-Ela Ahmed Dr. Hosam Salaheldin Ibrahim